ZINGS 志诚

TU510A CONTROLLER
USER'S MANUAL

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Overview

TU510 controller is an auto-transfer controller integrate measure/display, control, and three-remote function. This controller including three type: TU510a-MG/MM/GG,used for auto transfer control for two power supply system between Mains and Gens, Mains and Mains, or Gen and Gens. It has the following function:

- Micro-computer control, complete digital technology
- Configure the running mode of the controller according to the panel keys.
- According to the LED indicate the running status and running mode of the controller directly.
- Configure the running parameters according to the panel LED indicating and keys.
- Display the measuring data including voltage and frequency by LED.
- Interface RS485 port to PC (required RS485/RS232 transformer) can read/write, rectify all settings and data.

This manual is only available for TU510 auto transfer controller, anyone should read this manual carefully before use.

In order to avoid repetition in specification in this manual:

1.

Name	TU510a-MG	TU510a-GG	TU510a-MM
1# resource	Mains	1# Gen	1# Mains
2# resource	Gen	2# Gen	2# Mains

2.

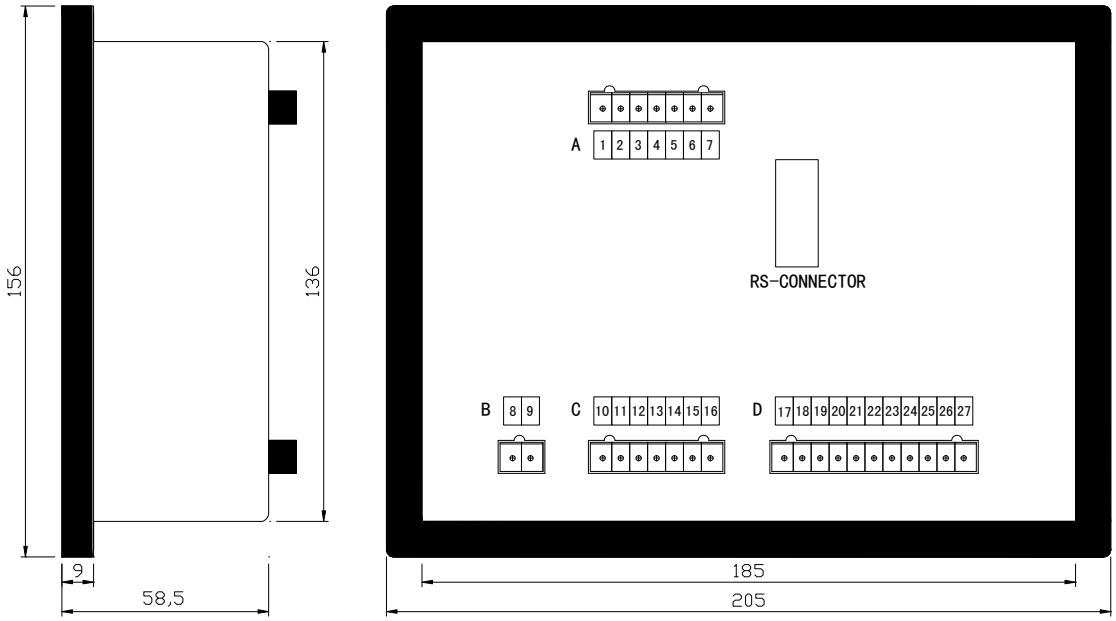
Short	Type
MG	TU510a-MG
GG	TU510a-GG
MM	TU510a-MM

1. Shape and connection

The Controller is integrated closely by die-casting panel made of prevent-burning, high-strength plastic and steel shell that has been spurt power. All connection lines of the controller connect through pin-like port with lock; make the device can be connected, moved, maintained and replaced easily and conveniently.

1.1 Size

Panel	W205mm x H156mm
Hatch	W186mm x H138mm
Thickness	D60mm（not connect）

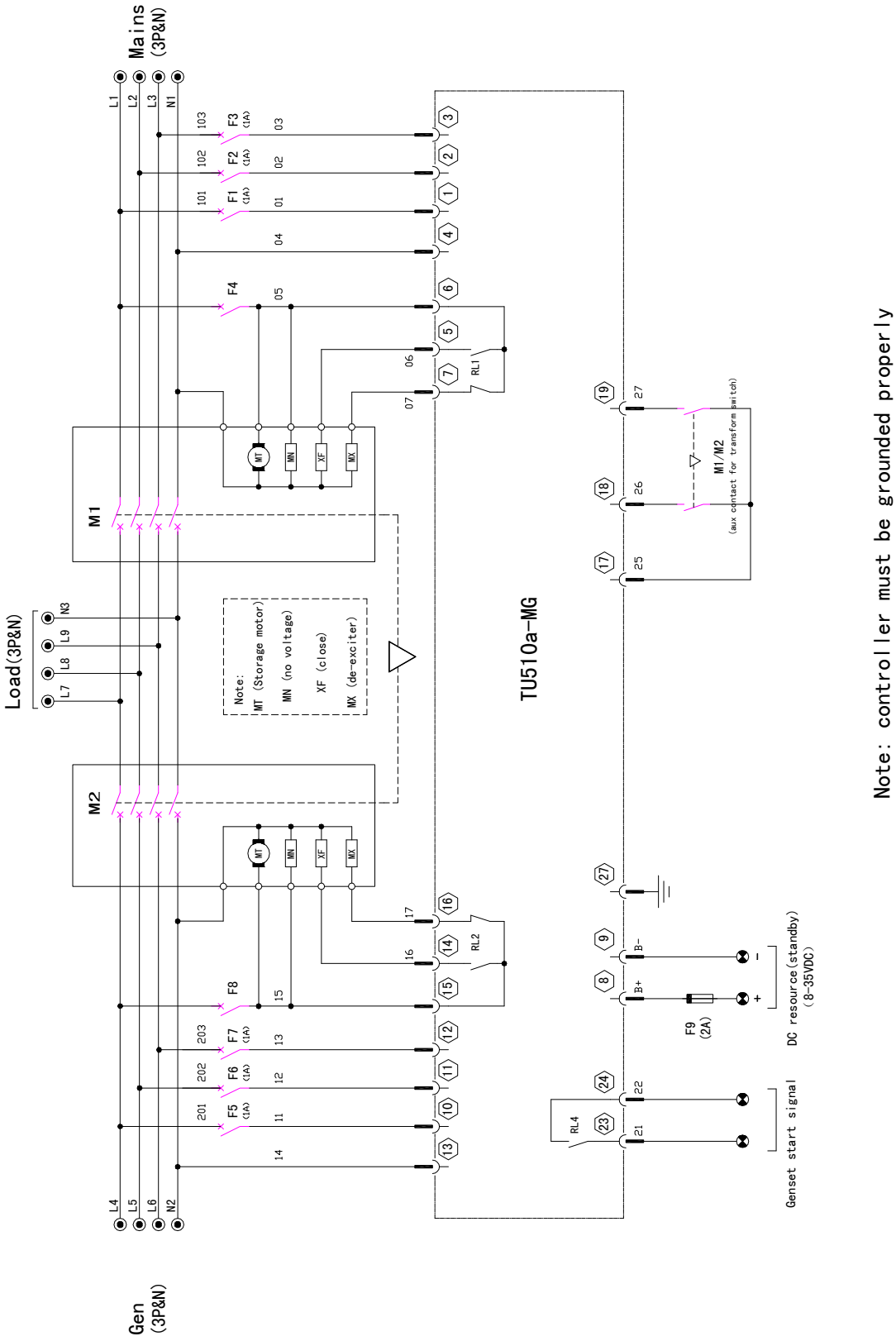


Note: the shell of this controller should properly grounded, well low competence could reduce the surge of the electricity system and transient procedure impact the meter.

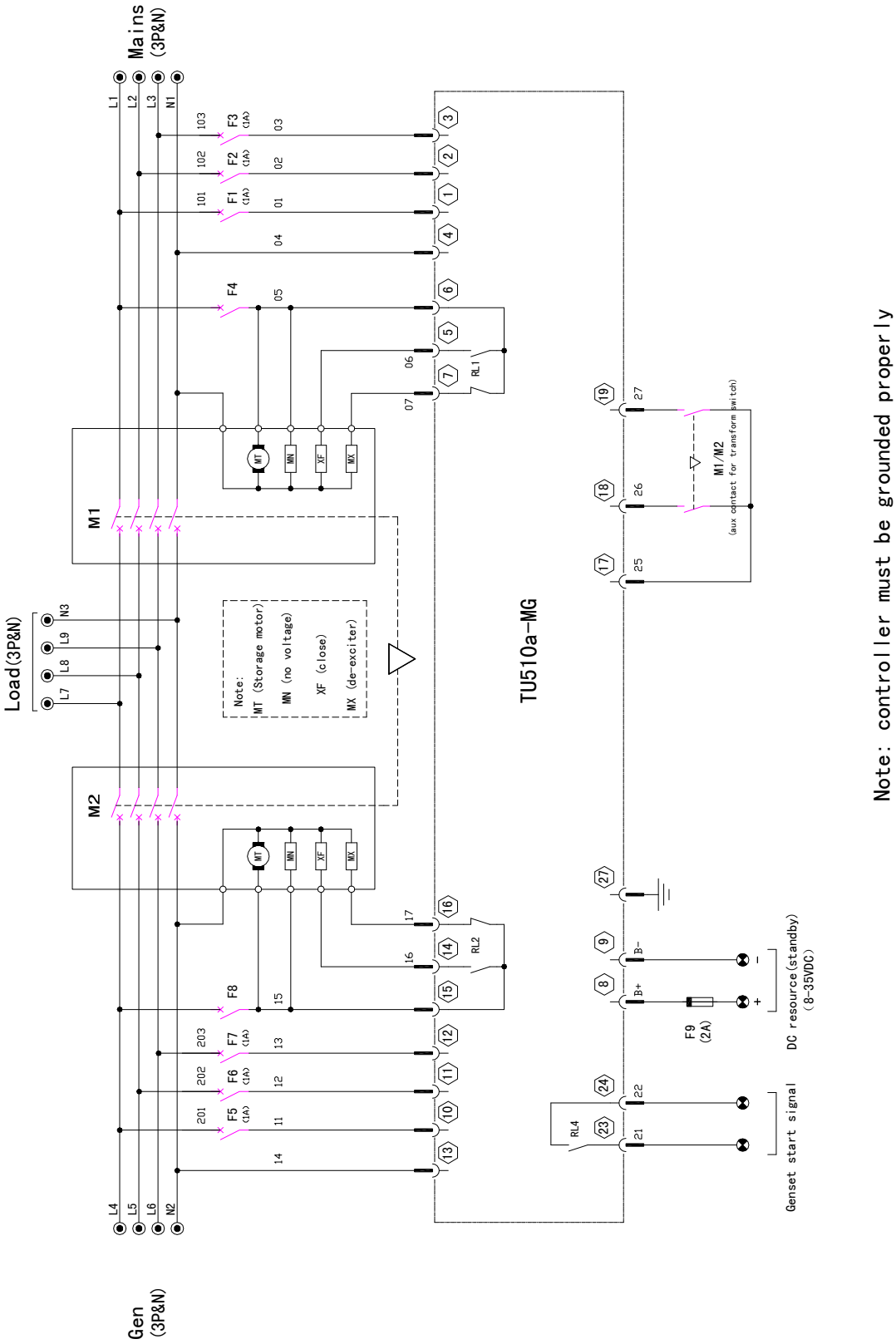
1.2 MG connection port

Pin No.	Function	Signal	Line
A1	Mains Phase A V input	0-300VAC	1mm²line
A2	Mains Phase B V input	0-300VAC	1mm²line
A3	Mains Phase C V input	0-300VAC	1mm²line
A4	Mains N zero line		1mm²line
A5	Relay normal open point(NO)	Transform switch at mains side control output 16A250VAC	1.5mm²line
A6	Relay common point(COM)		1.5mm²line
A7	Relay normal closed(NC)		1.5mm²line
B8	standby		1mm²line
B9	standby		1mm²line
B10	Gen. Phase A voltage input	0-300VAC	1mm²line
B11	Gen. Phase B voltage input	0-300VAC	1mm²line
B12	Gen. Phase C voltage input	0-300VAC	1mm²line
B13	Gen. N zero line		1mm²line
B14	Relay normal open point (NO)	Transform switch at Gen side control output 16A250VAC	1.5mm²line
B15	Relay common point (COM)		1.5mm²line
B16	Relay normal closed point (NC)		1.5mm²line
D17	Common point for status input signal		1mm²line
D18	Mains side aux contact signal	Low potential available	1mm²line
D19	Gen. Side aux contact signal	Low potential available	1mm²line
D20	standby	Low potential available	1mm²line
D21	standby	Low potential available	1mm²line
D22	standby	Low potential available	1mm²line
D23	Start output {COM}	Control the start output of the generator 5A30VDC	1mm²line
D24	Start input{N/O}		1mm²line
D25	Standby for output{COM}	Standby for output 5A30VDC	1mm²line
D26	Standby for output{N/O}		1mm²line
D27	Connect to external ground		1.5mm²line

1.3 MG typical wiring diagram



Available for TGME or transform switch of AC connector type

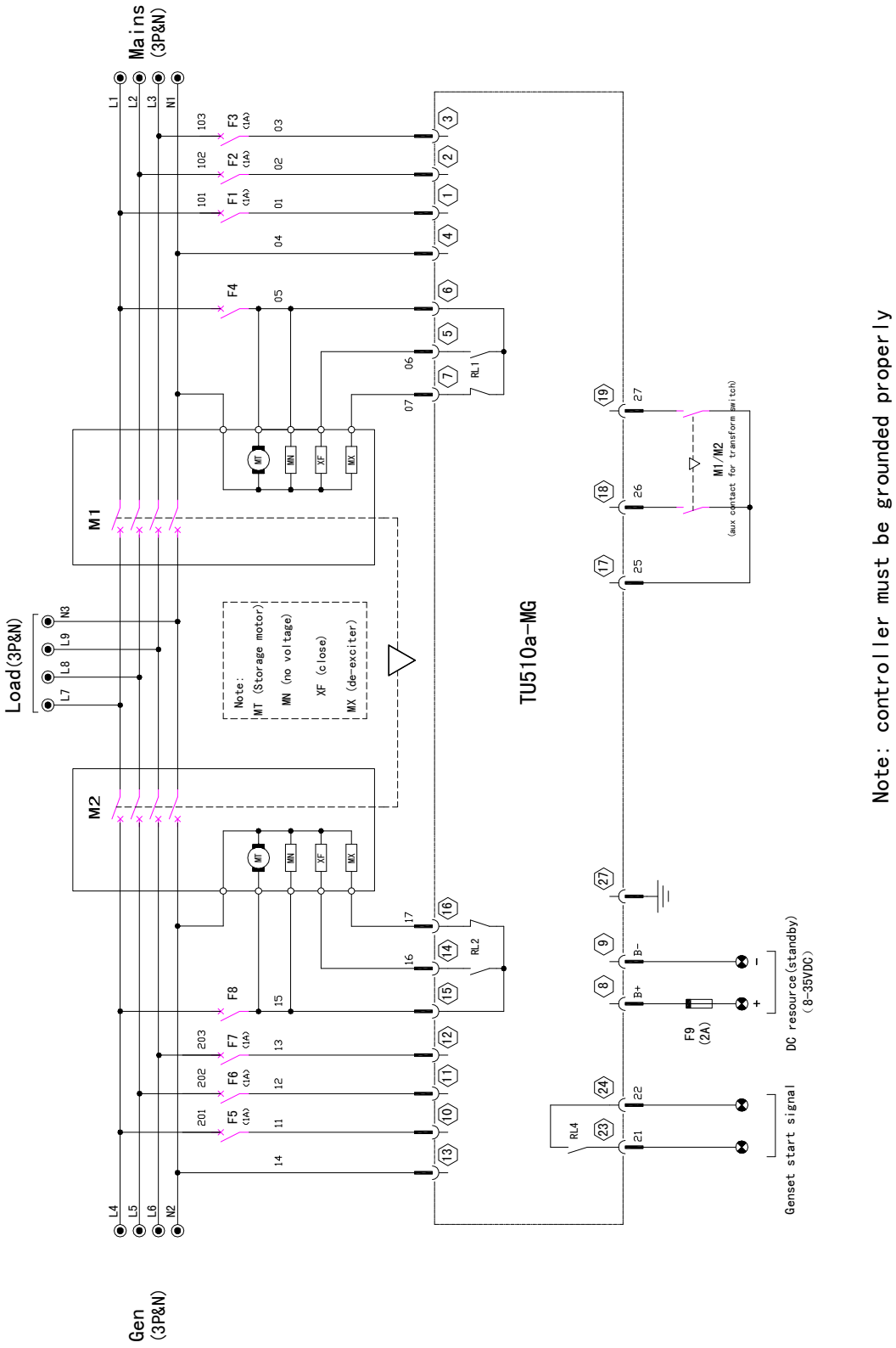


Available for transform switch of breaker type

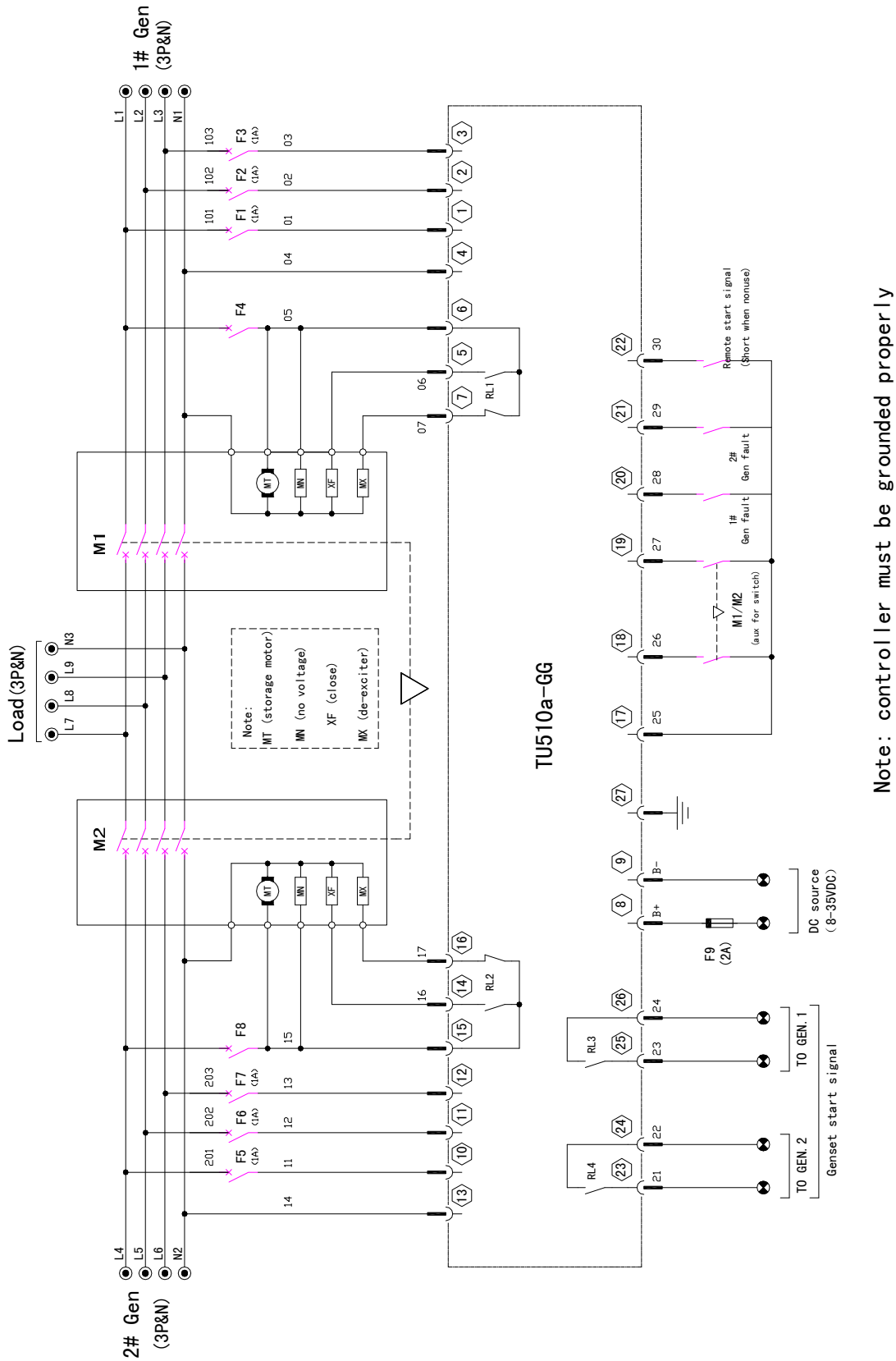
1.4 GG connection port

Pin No.	Function	Signal	Line
A1	1# Gen. Phase A V input	0-300VAC	1mm²line
A2	1# Gen. Phase B V input	0-300VAC	1mm²line
A3	1# Gen. Phase C V input	0-300VAC	1mm²line
A4	1# Gen. N zero line		1mm²line
A5	Relay normal open point(NO)	Transform switch 1# Gen. Side switch control the output 16A/250VAC	1.5mm²line
A6	Relay common point(COM)		1.5mm²line
A7	Relay normal closed(NC)		1.5mm²line
B8	working source +B	8~35VDC	1mm²line
B9	working source -B		1mm²line
B10	2# Gen. Phase A voltage input	0-300VAC	1mm²line
B11	2# Gen. Phase B voltage input	0-300VAC	1mm²line
B12	2# Gen. Phase C voltage input	0-300VAC	1mm²line
B13	2# Gen. N zero line		1mm²line
B14	Relay normal open point	Transform switch 2# Gen. Side switch control the output 16A/250VAC	1.5mm²line
B15	Relay common point		1.5mm²line
B16	Relay normal closed point (NC)		1.5mm²line
D17	common point for status input signal		1mm²line
D18	1# Gen. Side aux contact signal	Low potential available	1mm²line
D19	2# Gen. Side aux contact signal	Low potential available	1mm²line
D20	1# generator fault input	Low potential available	1mm²line
D21	2# generator fault input	Low potential available	1mm²line
D22	Remote start input	Low potential available	1mm²line
D23	2# start output {COM}	Control 2# generator start output 5A/30VDC	1mm²line
D24	2# start output {N/O}		1mm²line
D25	1# start output {COM}	Control 2# generator start output 5A/30VDC	1mm²line
D26	1# start output {N/O}		1mm²line
D27	connect to external ground		1.5mm²line

1.5 GG typical wiring diagram



Available for TGME or transform switch of AC connector type

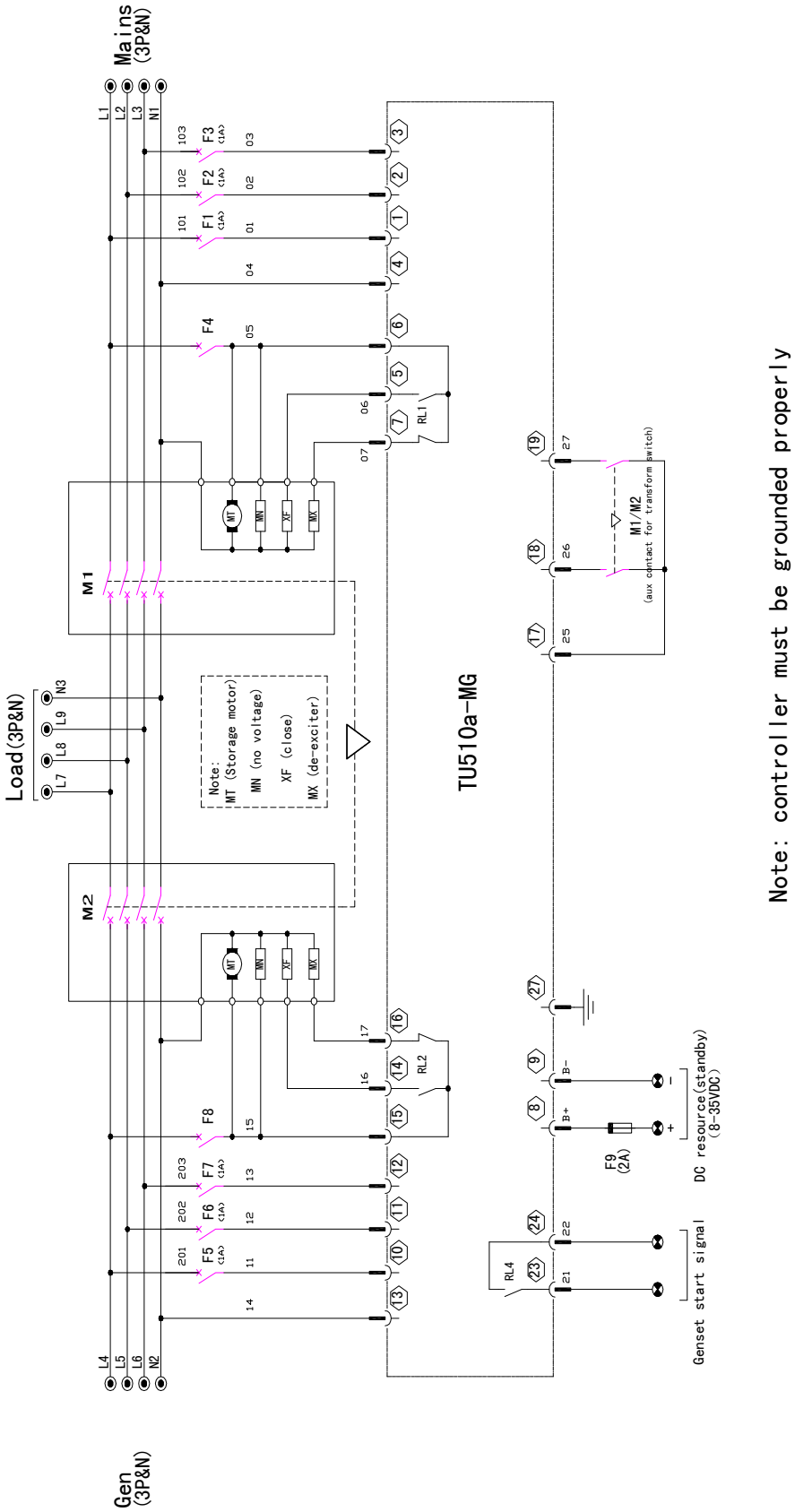


Available for transform switch of breaker type

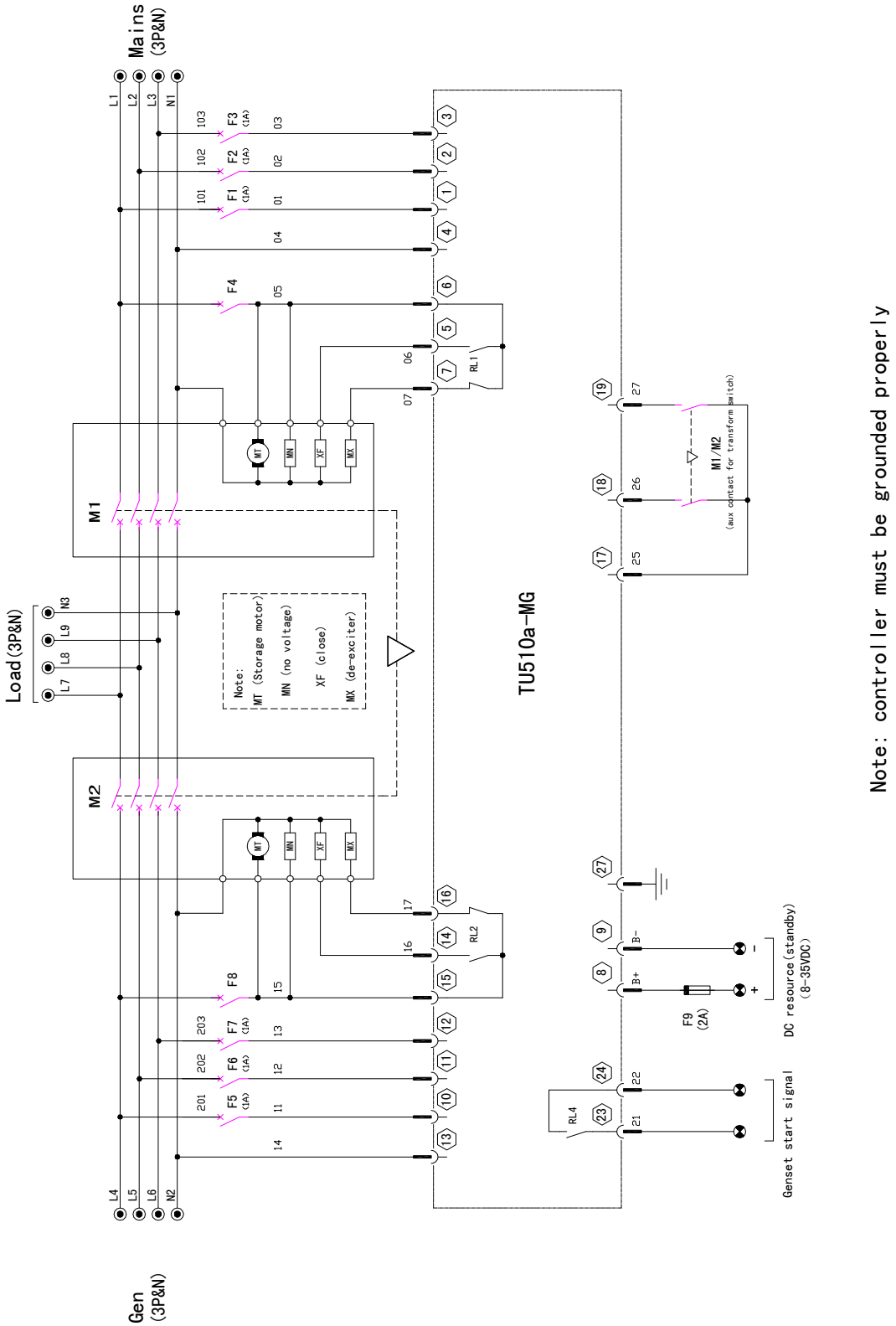
1.6 MM typical wiring diagram

Pin No.	Function	Signal	Line
A1	1# mains phase A voltage input	0-300VAC	1mm²line
A2	1# mains phase B voltage input	0-300VAC	1mm²line
A3	1# mains phase C voltage input	0-300VAC	1mm²line
A4	1# mains N zero line		1mm²line
A5	Relay normal open point (NO)	Transform switch at 1# mains side output 16A250VAC	1.5mm²line
A6	Relay common point (COM)		1.5mm²line
A7	Relay normal close point (NC)		1.5mm²line
B8	standby		1mm²line
B9	standby		1mm²line
B10	2# mains phase A voltage input	0-300VAC	1mm²line
B11	2# mains phase B voltage input	0-300VAC	1mm²line
B12	2# mains phase C voltage input	0-300VAC	1mm²line
B13	2# mains N zero line		1mm²line
B14	Relay normal open point (NO)	Transform switch at 1# mains side output 16A250VAC	1.5mm²line
B15	Relay common point (COM)		1.5mm²line
B16	Relay normal close point (NC)		1.5mm²line
D17	Status input signal common point		1mm²line
D18	1# mains side aux contact signal	Low potential available	1mm²line
D19	2# mains side aux contact signal	Low potential available	1mm²line
D20	standby	Low potential available	1mm²line
D21	standby	Low potential available	1mm²line
D22	standby	Low potential available	1mm²line
D23	Aux output{COM}	5A30VDC	1mm²line
D24	Aux output{N/O}		1mm²line
D25	Aux output {COM}	5A30VDC	1mm²line
D26	Aux output {N/O}		1mm²line
D27	Connect to external ground		1.5mm²line

1.7 MM typical wiring diagram:



Available for TGME or transform switch of AC connector type



Available for transform switch of breaker type

2. Operation panel

The operation panel including three parts: LED display for measuring parameters, operating keys and LED indicate for running status.

2.1 LED display and its keys.

Two lines of three bits LED on both left and right side simultaneously display the phase voltage and frequency of each phase, scroll page to refer voltage for other phase, and the LED, together with the operating keys, provide the user a friendly interface to configure the running parameters.

2.2 Menu system and LCD for running status

Function	Name
Enter next submenu/rectify/confirm	
Scroll up page menu/increase value	
Scroll down page menu/decrease value	

2.3 MG Operating keys and LED

Function	Name
AUTO key/indicator light This key used in AUTO mode, when controller in this mode, the LED above the key illuminate. Prior to mains, if mains in normal, then mains supply; if mains fault occur, Gen supply.	
MAN key/indicator light This key used in MAN mode for setting. When controller in this mode, the LED above the key illuminate, controller choose mains supply or Gen supply according to “TO MAINS”and“TO GENSET”key	
TEST key/indicator light This key used in test mode. When controller in this mode, the LED above the key illuminate. In this mode, controller simulates mains supply.	
TO MAINS key When the controller in MAN mode, when the mains voltage is normal, press this key switch to mains supply, the LED above the key illuminate.	
TO GENSET When the controller in MAN mode, if the Gen voltage is normal, press this key switch to Gen supply, the LED above the key illuminate.	

L. TEST key Test lamps, press this key all lamps should illuminate, if not, fault occurs.	

Note: LED above “TO MAINS”and“TO GENSET”keys indicate related close relay action.

2.4 GG Operating keys and LED

Function	Name
GEN.1Key/indicator light This key used for 1# Gen. priority mode. LED above the key illuminate when controller in this mode. 1# Gen. priority. When 1# Gen. normal, 1# Gen. supply; if 1# Gen failed, 2# Gen. supply.	
MAN key/indicator light This key used for MAN mode of the controller. LED above the key illuminate when controller in this mode. Controller select 1# Gen supply or 2# Gen supply according to “TO GEN.1” and “GEN.2” key.	
GEN.2key/indicator light This key used for 2# Gen. priority mode. LED above the key illuminate when controller in this mode. 2# Gen. priority. When 2# Gen. normal, 2# Gen. supply; if 2# Gen failed, 1# Gen. supply.	
TO GEN.1 key When the controller in MAN mode, if the 1# Gen. voltage is normal, press this key to switch 1# Gen. supply.	
TO GEN.2 key When the controller in MAN mode, if the 2# Gen. voltage is normal, press this key to switch 2# Gen. supply.	
L. TEST key Test lamps, press this key all lamps should illuminate, if not, fault occurs.	

Note: LED above “TO GEN.1”and“TO GEN.2”keys indicate related close relay action.

2.5 MM Operating keys and LED

Function	Name
MAINS1 Key/indicator light This key used for 1# mains priority mode. LED above the key illuminate when controller in this mode. 1# mains priority. When 1# mains normal, 1# mains supply; if 1# mains failed, 2# mains supply.	
MAN key/indicator light This key used for MAN mode of the controller. LED above the key illuminate when controller in this mode. Controller select 1# mains supply or 2# mains supply according to “TO MAINS1” and “TO MAINS2” key.	
MAINS2 Key/indicator light This key used for 2# mains priority mode. LED above the key illuminate when controller in this mode. 2# mains priority. When 2# mains normal, 2# mains supply; if 2# mains failed, 1# mains supply.	
TO MAINS1 key When the controller in MAN mode, ignore the 1# mains, press this key to switch 1# mains supply.	
TO GEN.2 key When the controller in MAN mode, ignore the 2# mains, press this key to switch 2# mains supply.	
L. TEST key Test lamps, press this key all lamps should illuminate, if not, fault occurs.	

Note: LED above “TO MAINS1”and“TO MAINS2”keys indicate related close relay action.

3. Installation

3.1 Panel

The controller fixed with four special screws.

If install the controller directly onto the body of the generator set or other device with sever vibration, preventing device must be installed.

3.2 Connection of the controller please refer to the drawing or above typical wiring diagram.

4. Control and operation

There are three control modes for the controller:

Type	Mode 1	Mode 2	Mode 3
TU510a-MG	Auto	Manual	Test
TU510a-GG	1# Gen priority	Manual	2# Mains priority
TU510a-MM	1# Mains priority	Manual	2# Mains priority

4.1 Setting mode

Operation	Description		
	MG	GG	MM
Press and hold “AUTO”/“GEN.1”/“MAINS1”key (for 2 seconds), the LED above the key illuminate, namely the controller running in Auto/1# Gen priority/1# Mains priority.			
Press“MAN”key (for 2 seconds), the LED above the key illuminate, namely the controller running in Manual mode.			
Press and hold “TEST”/“GEN.2”/“MAINS2”key(for 2 seconds, LED above the key illuminate, namely the controller running in test/ 2# Gen priority/2# Mains priority mode.			

Note: you can only choose one of the three mode.

4.2 MG auto transfer control（when in auto）

Operation	Description	
When controller in AUTO, mains supply delay begin if mains normal, after time out, transform switch at mains side close instantaneously, mains supply, mains supply LED illuminate.	Mains side	Gen side
	Va=220V	Va=0 V
	F=50.0HZ	F=0.0HZ
After the mains fault delay confirmed or the controller in TEST mode, oil engine input signal control the generator set to start. When voltage and frequency of the generator set reach preset, Gen supply delay begin. After time out, transform switch at Gen side close instantaneously, then Gen supplying, the	Mains side	Gen side
	Va=0 V	Va=220V
	F=0.0HZ	F=50.0HZ

Note: when mains fault occur, the controller is in de-energized status without display, at the same time, start signal closed. After normal voltage set up, the controller return displaying.

4.3 MG Transform by MAN

Operation	Description
Controller is in MAN mode, press“TO MAINS”(for 2 seconds), transform switch at mains side close. Mains supplying, the related LED illuminate.	
The controller is in MAN mode, press “TO GENSET”key (for 2 seconds), transform switch at Gen side close. Gen supplying, the related LED illuminate.	

Note: when in MAN mode, no matter whether Mains and Gen normal or not, you can close“TO MAINS”or“TO GENSET”. After the supply switch signal has output, the transform switch not in mains, nor in Gen, the transform signal output until open for power supply fault.

4.4 GG auto transform control（when in 1# Gen priority mode）

Operation	Description	
When the remote start signal is available and 1# start signal close, after the 1# voltage is normal, the 1# supply delay begin, when time out, the switch close, 1# Gen supplying, the related LED illuminate.	1# Gen side	2# Gen side
	Va=220V	Va=0 V
	F=50.0HZ	F=0.0HZ
When 1# failed or 1# fault occur during supplying. After the fault delay has confirmed, if 2# voltage is normal, then 2# supply delay begin, when time out, the transform switch automatically transform and 2# supplying, the related LED illuminate. The LED display the voltage and frequency value.	1# Gen side	2# Gen side
	Va=0 V	Va=220V
	F=0.0HZ	F=50.0HZ

Note: You can set 1# or 2# priority running period according to parameters TEC for type GG, when the remote start line is available, if the controller has already in 1# priority mode, Gen running will automatically transform to 2# priority mode after the TEC period set, and after a second TEC period it will switch to 1# priority mode, so cycle, if the set value is 0 will take no transforming action.

4.5 GG transform control by man

Operation	Description
Press “ TO GEN.1” in MAN mode (for 2 seconds), the transform switch at 1# Gen. Side close, 1# supplying, the related LED illuminate.	
Press “ TO GEN.2” in MAN mode (for 2 seconds), the transform switch at 2# Gen. Side closed, 2# supplying, the related LED illuminate.	

Note: when in Man mode, no matter whether the 1# Gen and 2# Gen is normal, you can switch and close according to the “TO GEN.1”or“TO GEN.2”keys. After the power supply transform signal output but the transform switch is not in 1# supply or 2# supply status, the transform signal will continue to output until the power supplied by 1# or 2# open for fault.

4.6 MM Control for auto transform（when in 1# Mains priority）

Operation	Description	
After the 1# mains voltage is normal, the related LED illuminate, 1# mains supply delay begin. When time out, the switch close, 1# mains supplying, the related LED illuminate.	1# Mains side	2# Mains side
	Va=220V	Va=0 V
	F=50.0HZ	F=0.0HZ
When 1# mains failed or 1# mains fault occur during supplying. After the fault delay has confirmed, if 2# voltage is normal, then 2# supply delay begin, when time out, the transform switch automatically transform and 2# mains supplying, the related LED illuminate. The LCD display:	1# Mains side	2# Mains side
	Va=0 V	Va=220V
	F=0.0HZ	F=50.0HZ
After 1# mains voltage recover, the related LED illuminate, 1# supply delay begin, when time out, the transform switch automatically transform and 1# supplying, the related LED illuminate.		

4.7 MM transform by MAN

Operation	Description
Press “TO MAINS1” in MAN mode (for 2 seconds), the transform switch at 1# mains side close, 1# supplying, the related LED illuminate.	
Press “TO MAINS2” in MAN mode (for 2 seconds), the transform switch at 2# mains side close, 2# supplying, the related LED illuminate.	

Note: when in Man mode, no matter whether the 1# Mains and 2# Mains is normal, you can switch and close according to the “TO NAINS.1”or“TO MAINS.2”keys. After the power supply transform signal output but the transform switch is not in 1# supply or 2# supply status, the transform signal will continue to output until the power supplied by 1# or 2# open for fault.

5. Measuring and display

1# resource three phase voltage	Va, Vb, Vc
1# resource frequency	F（measure frequency of L1）
2# resource three phase voltage	Va, Vb, Vc
2# resource frequency	F

6. Alarms

1# high voltage when 1# resource voltage of any phase higher than the 1# high voltage fault setting, after confirmed for delay, namely it occurring 1# resource high voltage fault, and the related close relay output will close.

1# low voltage when 1# resource voltage of any phase lower than the 1# low voltage fault setting, after confirmed for delay, namely it occurring 1# resource low voltage fault, and the related close relay output will close.

1# high frequency when 1# resource frequency of any phase higher than the 1# high frequency fault setting, after confirmed for delay, namely it occurring 1# resource high frequency fault, and the related close relay output will close.

1# low frequency when 1# resource frequency of any phase lower than the 1# high frequency fault setting, after confirmed for delay, namely it occurring 1# resource low frequency fault, and the related close relay output will close.

2# high voltage when 2# resource voltage of any phase higher than the 2# high voltage fault setting, after confirmed for delay, namely it occurring 2# resource high voltage fault, and the related close relay output will close.

2# low voltage when 2# resource voltage of any phase lower than the 2# low voltage fault setting, after confirmed for delay, namely it occurring 2# resource low voltage fault, and the related close relay output will close.

2# high frequency when 2# resource frequency of any phase higher than the 2# high frequency fault setting, after confirmed for delay, namely it occurring 2# resource high frequency fault, and the related close relay output will close.

2# low frequency when 2# resource frequency of any phase lower than the 2# low frequency fault setting, after confirmed for delay, namely it occurring 2# resource low frequency fault, and the related close relay output will close.

Generator fault When the controller detected generator fault signal input, it will immediately stop the start signal output, and close the related close relay output.

Note: high voltage/low voltage/high frequency/low frequency faults are also voltage faults.

7. Configuration

No.	Item		Preset	Scale
01	Communication address	Add	1	1~255
02	1# low voltage fault	UL1	AC198V	AC145~220V/0V
03	1# high voltage fault	UH1	AC253V	AC220~265V/999V
04	1# low frequency fault	FL1	45	45~50HZ/0HZ
05	1# high frequency fault	FH1	57	50~60HZ/99.9HZ
06	1# fault confirming time	DA1	5 s	0~~250 s
07	1# supply delay	DB1	5 s	0~~250 s
08	1# cool delay	DC1	5 s	0~~999 s
09	2# low voltage fault	UL2	AC198V	AC145~220V/0V
10	2# high voltage fault	UH2	AC253V	AC220~265V/999V
11	2# low frequency fault	FL2	45	45~50HZ/0V
12	2# high frequency fault	FH2	57	50~60HZ/99.9HZ
13	2# fault confirming time	DA2	5 s	0~~250 s
14	2# supply delay	DB2	5 s	0~~250 s
15	2# cool delay	DC2	300	0~~999 s
16	Auto transform time GG	TEC	0 小时	0.0～18.0 小时
17	Recover default value	DEF		
18	Quit	QUT		

Note: For item 08 and 16 are only available for GG type, other type will override them, and item 15 is available for MG/GG, the rest are common for each type.

Increase and decrease the parameter by degrees. When press plus or minus key long, the ones digit will changes one by one, after ten changes, the tens digit changes one by one, and hundreds position then, the rest may be deduced by analogy. Press "▶"two seconds to enter configuration, press"▼" and"▲" to scroll up or down pages at this time, press"▶" to rectify value, you should enter the password: "▲" "▲" "▶ " "▼" （2213）。

Example: (set the mains low voltage fault value of the controller to 175)

Operation	Key	Description	
Press "▶"for two seconds to enter configuration menu, LED display:		01 Add	1
Press "▼" one time then press "▶"one time, the LED display:		02 uL1	198 198
Press "▲"and then indicate entering password: "▲ ▲ ▶ ▼"		02 uL1	198 PASS
Press "▲▼"at this time to change parameters, the LED display:		02 uL1	198 175
After configuration, press "▶"long for two seconds to quit configuration.			

Example: (set the Gen supply delay of the controller to 10 seconds)

Operation	Key	Description	
Press "▶"for two seconds to enter configuration menu, the LED will display:		01 Add	1
Press "▼"six times, then press "▶"one time, LED display:		07 db1	5 5
Press "▲", then indicate entering password: "▲ ▲ ▶ ▼"		07 db1	5 PAAA
Press "▲▼"at this time to change parameters, the LED display:		07 db1	5 10
After configuration, press "▶"long for two seconds to quit configuration.			

Example: (recover all parameters to default value at factory)

Operation	Key	Description	
Press "▶"for two seconds to enter configuration menu, the LED will display:		01 Add	1
Press "▼"fifteen times, then press "▶"one time, LED display:		16 dEF	PASS
Enter password as indicate: "▲ ▲ ▶ ▼",then press "▶"		16 dEF	donE
Press "▲▼"at this time to change parameters, the LED display:		07 db1	5 10
After configuration, press "▶"long for two seconds to quit configuration.			

Configuration and operation method for other parameters is the same as above

8. Communication

(Optional, user could choose depending on application)

8.1 Introduction

The controller with an“RS CONNECTOR”communication port，which use match with the CI485A（CI232A）communication interface module, so as to made the controller possess RS485/RS232 industrial standard serial communication port. The serial communication adopts the designing of photoelectric insulation, besides, it installed protective circuit to prevent the interference and spoil from the error connection. RS485 adopts 9600-baud communication. The controllers with communication function possess the following benefits.

100% Remote signaling including running states and fault ones.

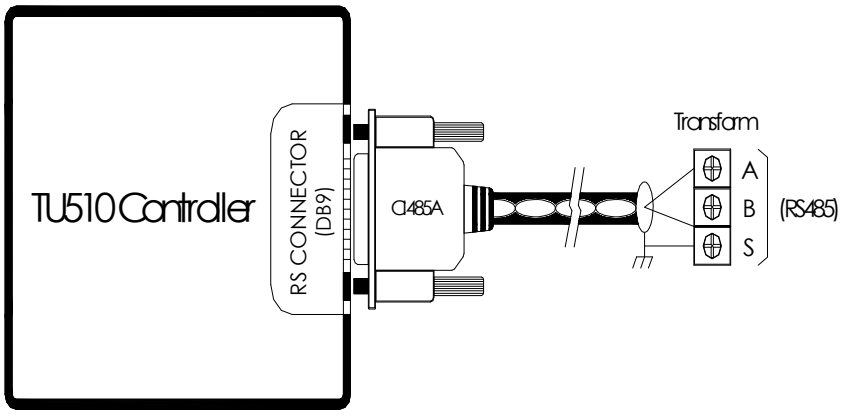
100% Remote measure data including measurement data of all controllers.

100% Remote control function, covering the whole control function of panel.

100% Remote adjustment function, including all configurable parameters of the controller.

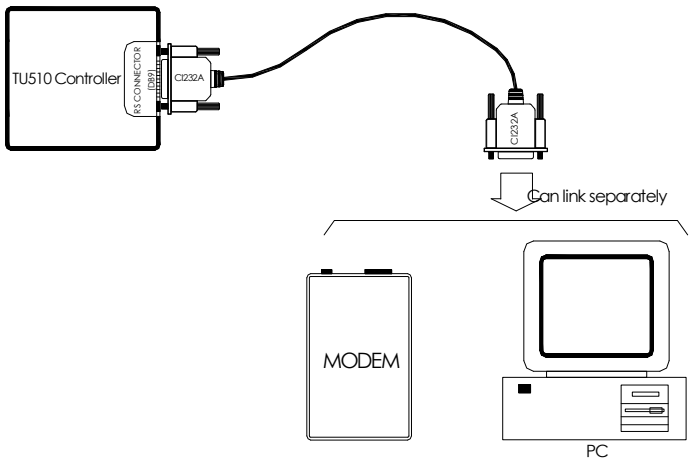
8.2 CI485 Communication Link

(Controller with RS485 com and CI48A accessory), more details please refer to the following wiring diagram：



8.3 CI232A Communication Link

Controller plus RS232 fittings, namely the controller have RS232 communication interface, typical wiring as following:

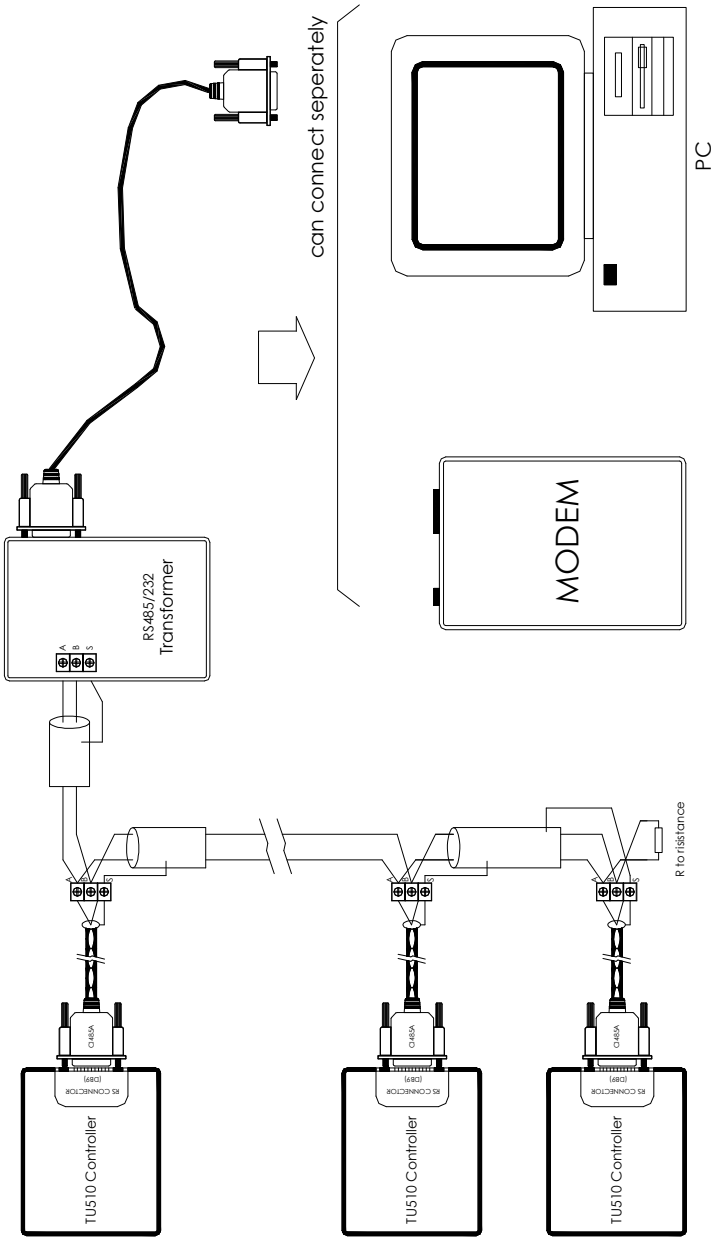


8.4 Multi-controller communication link

The communication interface provides users a method, to make the users fetch more information that cannot obtain from the panel. The relative software can display the whole parameters measured and state information; it also can set various parameters.

The controller with RS485 communication interface, which allows connect at least 255 same serial controllers to the same communication line. And each equipment has sole ID No. To switch PC or MODEM, you need to collocate another RS485/RS232 converter. Typical wiring diagram as below：

Note：Communication cable use high quality twisted pair cable with shielded, and its total length of cable less than 1000m. Each anode and cathode of RS485 interface must be connected properly, and the cable shield only can be connected to the earth at one side.



Communication Protocols

RS485 mechanism is a kind of network form by character signal between the computer and hardware device. Controller working baud rate is 9600-Baud, communication protocol is MODBUS-RTU. When it is working, the computer will send out a serial orders to the central pick-up controller, and then wait the reflect

data block.

NOTE: max number of words of write/read: read is 16, write is 14. Only continuous write order 10(hex) could be used for write.

Controller Data Cell Address

Address	Word	Content	Unit
$1000	1	Remote demond 01：transform to 1# resource side by Man 02：transform to 2# resource side by Man 05：enter Test/2# resource priority mode 06：enter Man mode 07：enter Auto/1# resource priority mode 09：lamp test	
$1001	1	1# resource phase C voltage	unit ： V
$1002	1	1# resource phase B voltage	unit：V
$1003	1	1# resource phase A voltage	unit：V
$1004	1	1# resource frequency	unit：Hz
$1005	1	2# resource phase C voltage	unit：V
$1006	1	2# resource phase B voltage	unit：V
$1007	1	2# resource phase A voltage	unit：V
$1008	1	2# resource frequency	unit：Hz
$1009	1	Switch status input	
$100A	1	Serial number SN	
$2001	1	Communication address	
$2002	1	1# resource low voltage	unit：V
$2003	1	1# resource high voltage	unit：V
$2004	1	1# resource low frequency	unit：Hz
$2005	1	1# resource low frequency	unit：Hz
$2006	1	1# resource delay for confirming default	unit：S
$2007	1	1# power supply delay	unit：S
$2008	1	2# Gen cool down delay(only for GG)	unit：S
$2009	1	2# resource low voltage	unit：V
$200A	1	2# resource high voltage	unit：V
$200B	1	2# resource low frequency	unit：Hz
$200C	1	2# resource high frequency	unit：Hz
$200D	1	2# resource confirming fault	unit：S
$200E	1	2# power delay for supply delay 间	unit：S
$200F	1	2# Gen cool down delay(only for MG/GG)	unit：S

9. Technical parameters

Working voltage: AC100～265V（linked internally，from phase A of the two source, external adding is not required）. Or DC8～35V

Max loss or power：＜3W

measure AC voltage input： 75～300V(ph-N)real virtual value

AC measure accuracy：0.5 class

Measuring frequency：45～65Hz

Operating surrounding temperature：-20～55℃

Storage surrounding temperature：-40～70℃

Switch control relay output：16A/250VAC

Aux relay output： 5A/250VAC/30VDC

10. Troubleshooting

Fault	Eliminating method
The controller is in abnormal status	Check the connection of the controller. If controller use AC resource, check the phase A voltage and the related fuse (switch) of the two resource. If the controller use DC resource, check the supplying status and the fuse of the DC resource.
The data displaying is not correct	Check the measuring line and the ground for proper connection
The transform switch is not transform	Check the line of the control circuit for the three phase voltage is in the high/low voltage and high/low frequency range, make sure the related relay action is normal, check the fuse of the close resource.
The transformation of the switch is normal, but the controller won't close.	Check the line of the control circuit, check the aux contact at the close side of the transform switch and the related circuit connection
Can't transform manually when in Man mode	Check the connection of the control circuit and the fuse of the close resource

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